This search summary contains the results of a literature search undertaken by the Lincolnshire Knowledge and Resource Service librarians in **January 2010**.

All of the literature searches we complete are tailored to the specific needs of the individual requester. If you would like this search re-run with a different focus, or updated to accommodate papers published since the search was completed, please let us know.

We hope that you find the information useful. If you would like the full text of any of the abstracts listed, please let us know.

Alison Price  alison.price@lpct.nhs.uk
Janet Badcock  janet.badcock@lpct.nhs.uk

**Librarians, Lincolnshire Knowledge and Resource Service**
Please find below the results of your literature search request. If you would like the full text of any of the abstracts included, or would like a further search completed on this topic, please let us know. A feedback form is included with these search results. We would be very grateful if you had the time to complete it for us, so that we can monitor satisfaction with the service we provide. Thank you!

Disclaimer
Every effort has been made to ensure that this information is accurate, up-to-date, and complete. However it is possible that it is not representative of the whole body of evidence available. All links from this resource are provided for information only. A link does not imply endorsement of that site and the Lincolnshire Knowledge and Resource Service does not accept responsibility for the information displayed there, or for the wording, content and accuracy of the information supplied which has been extracted in good faith from reputable sources. No responsibility can be accepted for any action taken on the basis of this information. It is the responsibility of the requester to determine the accuracy, validity and interpretation of the search results.

Lincolnshire Knowledge & Resource Service
Beech House, Witham Park, Waterside South, Lincoln LN5 7JH

Literature Search Results

Search request date: 25th January 2010
Search completion date: 28th January 2010
Search completed by: Alison Price

Enquiry Details
Bicycle Test of Van Gelderen

Opening Internet Links
The links to internet sites in this document are 'live' and can be opened by holding down the CTRL key on your keyboard while clicking on the web address with your mouse

Guidance on Searching within Online Documents
Links are provided to the full text of each of these documents. Relevant extracts have been copied and pasted into these Search Results. Rather than browse through lengthy documents, you can search for specific words and phrases as follows:

Portable Document Format / pdf. / Adobe
Click on the Search button (illustrated with binoculars) to open the search window. Type in the term you need to find and links to all references to that term will be displayed in the window. Jump to each reference by clicking it. You can search for more terms by pressing ‘search again’.

Word documents
Select Edit from the menu, the Find and type in your term in the search box which is presented. The search function will locate the first use of the term in the document. By pressing ‘next’ you will jump to further references.
Comment
As you suspected I have found very few papers explicitly mentioning the Van Gelderen test, none of which appear to address validity.

Research
The test was first reported in the paper below:

The authors describe a simple clinical adjunct to the routine neurological examination of patients with intermittent cauda equina compression syndrome. The "bicycle test" helps exclude intermittent claudication due to vascular insufficiency and frequently confirms the relationship of posture to radicular pain.

Cited by
Further research

S.A. Thomas / Spinal stenosis: history and physical examination

Extract:
The bicycle test, first described by Van Gelderen [12], can help differentiate the two entities. The spinal stenosis patient with neurogenic claudication should tolerate the exercise, performed in a forward flexed position and with little axial load applied. Patients with vascular claudication, however, will become symptomatic as tissue hypoxia results from the added demand of the exercise exceeding the oxygen-delivering capability of the diseased vasculature. Full text below:
http://www.med.nyu.edu/pmr/residency/resources/PMR%20clinics%20NA/PMR%20clinics%20NA_sports%20med/stenosis%20HPI_PMRClinics.pdf


Background: The relationship between objective measurements and subjective symptoms of patients with spinal stenosis and the degree of narrowing of the spinal canal is not clear. The purpose of this study was to evaluate patients undergoing surgery for lumbar spinal stenosis and intermittent neurogenic claudication with functional testing, quantitative imaging, and patient self-assessment.

Methods: Sixty-two patients with lumbar spinal stenosis and neurogenic claudication were prospectively enrolled in the study. All underwent preoperative magnetic resonance imaging and/or computed tomography myelography, and all were treated with decompressive surgery and were followed for a minimum of two years. The evaluation included treadmill and bicycle exercise tests as well as patient self-assessment with use of the Oswestry Disability Index and a visual analog pain scale preoperatively and postoperatively.

Results: Preoperatively fifty-eight (94%) of the patients had a positive result (provocation of symptoms) on the treadmill test and twenty-seven (44%) had a positive result on the bicycle test, whereas postoperatively six and twelve, respectively, had positive results. The mean preoperative scores on the Oswestry Disability Index and visual analog pain scale were 58.4 and 7.1, respectively. Postoperatively, these scores decreased to 21.1 and 2.3, respectively, and both decreases were significant (p < 0.05). Forty-seven (76%) of the patients were seen to have central stenosis on the preoperative imaging studies; forty-one of them had a cross-sectional area of the dural tube of <100 mm² at at least one level and twelve had a cross-sectional area of <100 mm² at at least two levels.

Conclusions: A positive treadmill test was consistent with a diagnosis of spinal stenosis and neurogenic claudication in >90% of the patients preoperatively. Following surgical decompression of the lumbar spinal stenosis, more functional improvement was demonstrated by the treadmill test than by the bicycle test. The scores on the Oswestry Disability Index and visual analog pain scale also improved postoperatively. The severity of central canal narrowing at a single level does not appear to limit the postoperative improvement in either functional ability or patient self-assessment. Patients with multilevel central stenosis were, on the average, older and walked a shorter distance preoperatively and postoperatively, although the improvement in their postoperative self-assessment scores was similar to that of patients with single-level stenosis.

Cites the original Dyck paper in the references

Lumbar canal stenosis: Start with nonsurgical therapy

Although surgery is widely viewed as the definitive therapy for lumbar spinal stenosis, no randomized trials have compared surgical vs medical treatment. One study found that 60% of surgically treated patients improved, compared with 30% of those treated nonsurgically. We believe an initial nonsurgical approach is advisable for most patients.

Extract:
The most important aspect of neurogenic claudication is the relationship of symptoms to posture. Symptoms occur with spinal extension and are relieved in flexion. Patients usually have no symptoms or have minimal discomfort when seated or supine. They can walk longer distances with less pain in a forward flexed position, such as when using a grocery cart while shopping (the “grocery cart sign”). They may be able to exercise using a stationary bicycle in the seated flexed position for a much longer time (the bicycle test of Van Gelderen) than when walking in the erect position on a treadmill.

Full text at: http://ccjm.org/content/69/11/909.full.pdf

Diagnosis of Intermittent Vascular Claudication in a Patient With a Diagnosis of Sciatica

Case Reports John C Gray

Background and Purpose. The purpose of this case report is to illustrate the importance of medical screening to rule out medical problems that may mimic musculoskeletal symptoms. Case Description. This case report describes a woman who was referred with a diagnosis of sciatica but who had signs and symptoms consistent with vascular stenosis. The patient complained of bilateral lower-extremity weakness with her pain intensity at a minimal level in the region of the left sacroiliac joint and left buttock. She also reported numbness in her left leg after walking, sensations of cold and then heat during walking, and cramps in her right calf muscle. She did not report any leg pain. A medical screening questionnaire revealed an extensive family history of heart disease. Examination of the lumbar spine and nervous system was negative. A diminished dorsalis pedis pulse was noted on the left side. Stationary cycling in lumbar flexion reproduced the patient's complaints of lower-extremity weakness and temporarily abolished her dorsalis pedis pulse on the left side. Outcomes. She was referred back to her physician with a request to rule out vascular disease. The patient was subsequently diagnosed, by a vascular specialist, with a “high-grade circumferential stenosis of the distal-most aorta at its bifurcation.” Discussion. This case report points out the importance of a thorough history, a medical screening questionnaire, and a comprehensive examination during the evaluation process to rule out medical problems that might mimic musculoskeletal symptoms.

Extract:
Special test of the vascular system (van Gelderen bicycle test).
Exercise testing is an important part of a complete evaluation in patients suspected of having occlusive vascular disease. Pulses are palpated at rest and then quickly after the patient has exercised to induce symptoms. Ischemia secondary to exercise causes the peripheral arterial beds to dilate. This dilation of the peripheral arterial beds decreases the peripheral vascular resistance, which diminishes the pulse amplitude.
The van Gelderen bicycle test is designed to stress the LE vascular system without causing any central canal or foraminal stenosis that could be misinterpreted as intermittent neurogenic claudication. The patient was instructed to cycle at a moderate pace (90 rpm) for 5 minutes or until she felt the onset of her symptoms. Lumbar flexion (high seat height with low handle bars) was used to help minimize any effect from a neurogenic claudication, which would be exacerbated in lumbar extension and relieved by lumbar flexion. A positive test is indicated by a reproduction of some or all of the patient's symptoms in the same extremity that demonstrates a decrease in the pulse amplitude of a particular arterial branch. The test reproduced the patient's symptoms, and her legs collapsed as she stepped off the bicycle after 5 minutes. Her dorsalis pedis pulse on the left side was temporarily abolished (grade 0/4).

Full text at:
http://ptjournal.apta.org/cgi/reprint/79/6/582.pdf